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DEVOTED TO THE PRESERVATION OF EVERY KIND OF USEFUL INFORMATION RESPECTING THE STATE.

EDITED BY SAMUEL HAZARD.

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APPENDIX

TO DR. LIEBER'S LETTER.

(See Register, page 216.)

I.

Extract of the Warden's Report, to the Board of Inspectors of the Eastern Penitentiary, (in Pennsylvania,) in 1834.*

"In my last annual report, I alluded to the want of common school learning, which prevailed so generally among convicts. On a more minute examination of this subject, I find that of the whole number received into this penitentiary, from the opening, viz: two hundred and nineteen, that forty-two could neither read nor write; fifty-nine could read, but not write, and one hundred and eighteen could read and write: of the latter class, one had been educated at a university, one had a good English education, and is a tolerable Latin and French scholar, one understands English, Dutch and Hebrew; besides these, there are no more than seven who have had a good education, and not more than two others who could read and write tolerably, leaving ninety-eight who could read or write indifferently, many of these as well as most of those who could read only, were not able to read a sentence without spelling many of the words. It is not only in their elementary education that these have been neglected in their youth, but also in another respect, namely, their ignorance of trades and occupations to qualify them for useful citizens. On an investigation of this point, I find that out of the whole number (219) only thirty were regularly bound and served out their apprenticeship, sixteen remained during their minority with their parents, thirty-eight were apprenticed, but left their masters under various pretences, most of them ran away, and gave as a reason, the severity with which they were treated; the want of food, clothing, &c.; two of them declare that their masters first taught them to steal; eight were slaves until twenty-one or twenty-eight year of age, and one hundred and twenty-one were never apprenticed, but were either hired by their friends or themselves, and lived in this unsettled way during their minority.

"There are among mankind some who have been liberally educated, and carefully superintended during their youth, who nevertheless become abandoned, and we see others, without these advantages, rise to the first stations in society, yet the disproportion is great. I therefore believe, that had the two hundred and nineteen convicts above mentioned, received a suitable education, both moral and physical, and been placed with good masters until twenty-one years of age to learn some practical business, where they would be taught industry, economy, and morality, instead of spending their youth as they have, that few of them would ever have been inmates of a prison. All philanthropists agree, that the best mode of preventing crime, is properly to educate youth."

* By Samuel R. Wood, Esq.

II.

Letter of Mr. Wiltse, Agent of Sing-Sing State Prison.

STATE PRISON,
Mount Pleasant, Aug. 27, 1834.

My Dear Sir,—

In reply to your favor of the 22d inst., I hand you enclosed such statements as I have been able to collect.

Whatever may be the fact in other countries, there can be but little doubt but education, and early application to some kind of business, would have a powerful tendency to decrease crime. From my long intimacy with criminals, I have found that a large majority of convictions may be traced to the formation of bad habits in *early life*, from a total neglect on the part of their parents, or guardians, in giving them education, and confining their attention to some regular, systematic business.

I am, very respectfully,
Yours,
ROB. WILTSE.

To Dr. F. Lieber.

N. B.—You will observe that but 50 out of 842, have received any thing like an education.

R. W.

There are at present 842 prisoners.
170 prisoners cannot read nor write.
34 ' have never been at school of any kind.
85 ' know how to read, but not to write.
510 ' know how to read and write, but a large proportion of this number very imperfectly.
42 ' received a good common English education.
8 ' went through a college.
485 have been habitual drunkards; about one-third of the above number actually committed their crimes when *intoxicated*.

The other queries about the apprenticeships I cannot answer correctly, without going to each man in the prison; at present, my time will not permit me to do it.

R. W.

Addition from page 149, *of A Constitution and Plan of Education for Girard College, for Orphans, Philadelphia*, 1834.

"As it is a question of great interest to the criminalist and moralist, to know how many convicts have lost their parents at an early age, I begged Mr. Wiltse, the agent of the Sing-Sing Penitentiary, to answer certain queries, which he promptly did, with that kindness with which he has always afforded me information respecting the state prison under his superintendence. There are about 800 convicts in Sing-Sing. Some few of them were unable to say when they had lost their parents; of whom, therefore, many must be supposed to have lost them early; of the others,

48 lost their parents before they were five years old.
72 ' after they were five years old, and before they were 14 years old.
41 ' after they were 14 years old, and before they were 18 years old.

161 lost their parents before they had arrived at their

eighteenth year, which makes one-fifth of all the prisoners. If we add to them, those who were unable to give an account of themselves, we may say that nearly one-fourth of all convicts lost their parents before they were eighteen years old. Of these, probably the greater part, say three-quarters, therefore nearly one-fifth of the whole number, fell into vice in consequence of their forlorn situation—of having become orphans at an early age."

III.

Letter of Rev. Mr. Smith, Chaplain of Auburn State Prison.

STATE PRISON,
Auburn, September 12, 1834.

Dear Sir,—

The agent and keeper has just received, through Governor Marcy, your communication, making certain inquiries respecting the former character of the convicts in this prison, as it regards their education, habits, &c.; and as my sphere of duties has led me to be more familiar than he is with the subject, he requests me to furnish the answer, which I most cheerfully do.

Some of the questions, however, I cannot answer at all, and few, if any, of the others, in *precisely the form in which they are proposed*, without interrogating, separately, six or seven hundred convicts, which, with my limited opportunities of intercourse with them, would necessarily delay this reply for months.

I must therefore beg you to accept, as the best reply which I can at present give to your interrogatories, the following statements, (taken from minutes which I have at hand) from which you will, I hope, be able to glean the *substance* of the information sought, on most of the points of inquiry. The statements which follow, relate to the 670 convicts (twenty-eight of whom are females) in prison on the first ult.

CRIMES.

Education—Five Classes	Murder.	Manslaughter.	Assault and Battery to Kill.	Rape.	Assault and Battery to Rape.	Perjury.	Robbery.	Arson.	Forgery.	Passing Counterfeit Money.	Burglary.	Incest.	Sodomy.	Bigamy.	Grand Larceny.	Petit Larceny, 2d offence.	Breaking Jail.	Total.
Of Collegiate Education									2						1			3
Of Academical do									3						5			8
Of Common do	1	6	7	1	4	4	4	2	41	21	24	3	1	1	70	13	1	204
Of very poor do	3	4	12	2	4	4	3	4	25	23	33	1	1	1	105	37	5	267
Without any do		4	12	8	4	4	6	6	3	8	26	1		1	66	35	4	188
Total . .	4	14	31	11	12	12	13	12	74	52	83	5	2	3	247	85	10	670

CRIMES.

Habits—in respect to the use of Spirituous Liquors.	Murder.	Manslaughter.	Assault and Battery to Kill.	Rape.	Assault and Battery to Rape.	Perjury.	Robbery.	Arson.	Forgery.	Passing Counterfeit Money.	Burglary.	Incest.	Sodomy.	Bigamy.	Grand Larceny.	Petit Larceny, 2d offence.	Breaking Jail.	Total.
Excessively Intemperate .	3	9	16	5	8	5	7	4	22	9	35	3	1		87	37	7	258
Moderately Intemperate . .	1	5	11	5	4	6	3	6	20	24	28	2	1	2	95	29	3	245
Intemperate . . .	4	14	27	10	12	11	10	10	42	33	63	5	2	2	182	66	10	503
Temperate Drinkers . . .			4	1		1	3	2	31	19	17			1	61	19		159
Total Abstinents . . .									1		3				4			8
Total . . .	4	14	31	11	12	12	13	12	74	52	83	5	2	3	247	85	10	670

Under the influence of spiritous liquors at the time of committing their crimes	402	Married	352
Had intemperate parents	257	Lost wives by death, previous to conviction	31
Lost or left parents before 21 years of age	397	Left wives previous to conviction	86
Do do 17 do	262		— 117
Do do 14 do	121	Living *with* wives when arrested	235
Do do 10 do	58		
Had been in Sabbath School previous to conviction	19	Unmarried	318
Had been habitual daily readers of the Bible	25	Lost or left wives previous to conviction	117
Had committed the Decalogue to memory	74	Living *without* wives when arrested	435
Had been strict observers of the Sabbath	11	Children of the married convicts	953

REMARKS.

Under the head "Education," my fifth class answers to your first—"Do know neither to write nor to read." It embraces not those only who did not know the alphabet, but all those who could read in the New Testament, when they came to prison.

My fourth class answers, with little variation, to your second—"Know how to read, but not to write."—Some of them could write very poorly, but few of them more than their names.

My third class embraces some of your third, fourth and fifth—("Know to read and write"—"Know to read, write, and cast accounts"—"Received a good common English education"—but consists chiefly of your fourth. There are a few in it who can be said to have "received a *good* common English education."

The other classes are sufficiently explained by the terms used.

Regretting, extremely, that I am unable to answer inquiries more definitely,

I am, my dear Sir,

Most respectfully yours,

B. C. SMITH,

Chaplain of Auburn State Prison.

DR. FRANCIS LIEBER.

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IV.

Letter of Mr. Pilsbury, Warden of Connecticut State Prison.

STATE PRISON,
Wethersfield, Sept. 23, 1834.

Dear Sir—

Yours of the 12th inst. came duly to hand, and is cheerfully replied to as soon as answers to your questions could be obtained. If the following statements should somewhat more than cover the ground embraced in your inquiries, I doubt not, that your interest in the subject, will cause you to give them a welcome reception.

The whole number of convicts in the Connecticut State Prison is 180. No convict here has ever received either a college, or classical education; nor has any one of such education ever been an inmate of this prison. The Chaplain, who, from 1827 to 1830, was acquainted with nearly 1000 convicts, in the Mount Pleasant State Prison, at Sing Sing, N. Y., and with many other convicts in the prisons in Philadelphia, Baltimore and Auburn, has never known a liberally educated convict in prison.

The proportion of 8 in 100 convicts when they came to prison, could read, write and cypher.

The proportion of 46 in 100 of convicts, could read and write.

'	32 in 100	'	could read only.
'	22 in 100	'	could neither read nor write.
'	72 in 100	'	never learnt any trade.
'	24 in 100	'	began to learn or learned trades which they did not follow.
'	4 in 100	'	have followed regular trades.

The proportion of 44 in 100 convicts, committed their crimes while under excitement, caused by the use of ardent spirits.

There is no convict here who, before his conviction, could read and write, and who was of temperate habits, and followed a regular trade.

Of those convicts here, who could read and write, and were temperate, there are	2 in 100
Of those who could read, write, and followed a trade, there are	4 in 100
' who are owners of real estate	6 in 100
' who are owners of real estate, and were temperate	2 in 100
' who were owners of real estate, and unmarried	0
' who have never been married	64 in 100
' who were married, and followed a trade	4 in 100
' who were married, followed a trade, and were temperate	0
' who acknowledge themselves to have been habitual drunkards	75 in 100
' not natives in Connecticut	40 in 100
' deprived of their parents, before they were 10 years old	32 in 100
' deprived of their parents, before they were 15 years old	15 in 100
' those who are colored are	*25 in 100

The maximum inclination to crime, appears to be at the age of 25.

From 1790 to 1834, there were 1,113 instances in which individuals were sentenced to the State prison for the commission of crime. These crimes may be ranged under the three following heads in these proportions, viz:

Violence,	*Theft,*	*Fraud,*
190	716	207

Upon an average, each criminal cost the State for his apprehension and conviction, $75, and the average term of time that each was sentenced to remain in confinement, (abating 45 sentences for life) has been 3 years.

Since the prison has been established in this place, some seven or eight years ago, the number of convicts has considerably increased, and hence, the French commissioners, and English gentlemen may have naturally inferred, that there must have been an increase of crime in equal proportion. But the truth of this matter seems to lie here. As soon as the new prison was built, the criminal code was revised, and alterations made so as to punish a larger number of offences, with confinement in the State Prison. Besides, because the discipline of the prison was thought to have a strong tendency to reform those, who came under its influence, and as such economy was used, as to make the labor of the convicts more than meet the expenses of the whole establishment, the courts in the different counties, were more than ever inclined to sentence individuals to the State prison for the same offences.—For some time past there has been a very manifest decrease in this State in the instances both of crime and convictions. Ever since last January, there has been a diminution of at least 20 in the number of convicts.

Viewing with high satisfaction the deep interest which you evince in that department, where my labors have for many years centred,

I am Sir,

With sentiments of sincere regard, yours, &c.

A. PILSBURY,

Warden of Connecticut State Prison,

pr. G. Barrett.

TO DR. F. LIEBER,
Philad.

* In the State blacks are to the whites as 3 to 100.

OBSERVATIONS BY DR. JULIUS.

Having had the privilege, during my stay in the city of Philadelphia, to assist at a meeting of the members of the Society for Alleviating the Miseries of Public Prisons, where the preceding Letter of Dr. Leiber on the Relation between Education and Crime, was read, I was requested to state what I thought to be the result of the school system of Prussia in reference to this interesting question. I shall refer, therefore, as shortly as possible, the few conclusions I have thought myself competent to deduce from an uninterrupted observation of the number of crimes, as well as of the state of education in most of the countries of Europe and America, during ten years, without claiming for what I have to say a greater authority than the observations of a single individual, spending the largest part of his time in an inland continental capital, may entitle him.

The well known—and, since Mr. Cousin published his interesting Report—far-famed Prussian system of National Education, went properly into practice in the year 1819, and has three fundamental principles and supporting pillars.

First, the erection of seminaries or schools for teachers in the elementary schools, of which Prussia, with a population equal to that of the United States, has now forty-three, of the Protestant and Catholic denominations, furnishing annually from eight to nine hundred teachers, well informed and trained during three years, for their future avocation.

Secondly, the legal obligation of parents, guardians, &c. to send children under their care, if they are not instructed by qualified teachers* at home, or in authorized private schools, to the public schools, from the first day of their seventh to the last day of their fourteenth year.

Thirdly, the foundation of the whole system on a religious and moral basis, so that the first or the two first hours of each day are devoted entirely to a regular course of religious instruction, teaching, besides the reading of the scriptures, (for the Catholics, histories taken from the Bible,) all the duties of man towards his Creator, the constituted authorities, and his fellow creatures, as they are inculcated by the gospel.

These general regulations on education have been gradually augmented and strengthened by the Prussian Minister of Public Instruction, with a particular care for the reformation of juvenile offenders. In this way, since the year 1820, twenty-eight institutions for juvenile delinquents, or neglected children, *none* of them larger than for sixty boys or girls, have been established and supported by voluntary subscriptions, in different parts of the kingdom, under the especial protection of the above-mentioned minister. Since 1828, the board of the same minister has collected from all the tribunals and courts of law in the kingdom, regular returns of all the indictments brought before them, against boys or girls, not older than seventeen years. The numbers furnished by these official returns, and the proportion of this kind of indictments in each year, to the general population of the monarchy, are the following:

	1828	1829	1830	1831
Juvenile Indictments.				
Until 11 years accomplished,	81	74	72	94
From 11 to 17 years,	671	517	544	638
Whole number of committed children	752	591	616	732
Uninstructed children	80	54	60	56
Children not yet having taken the communion*	469	410	357	431
Proportion of the whole population	1:16924	1:21524	1.21167	1:17460

The first fact resulting from this table is, that under the Prussian School system, a simultaneous *increase* of the population of three per cent, (from 12,700,000 to 13,000,000) and a *decrease* of indictments against children, of three per cent has taken place. This cheering fact, connected with the remarkable circumstance, that the indictments against children below eleven years, who had enjoyed the blessings of the system only during four years, have *increased*, (from 81 to 94) when a large *decrease* of the indictments against children of more than eleven years, (from 671 to 638) took place, which were able to reap the full benefit of a religious and moral education, seems to prove undeniably that the effects of the system have been good and beneficial.

Another remarkable fact resulting from these Prussian returns, is, that the smallest number of juvenile delinquencies occurred in the least instructed entirely agricultural provinces of Pomerania and Posen, (the first protestant, the last Catholic) and the largest numbers in the best instructed but also most industrious and manufacturing provinces, those of Saxony and the Rhenish countries, whose commercial and manufacturing districts surpass even the capital in this kind of transgressions.

Trying to elucidate the circumstance just mentioned, I must state that the crimes for which the children were committed in those parts of the kingdom, where their number was small, have been generally of a more henious character (arson, &c.) than in the provinces with more indictments, but principally for fraud or larceny. Similar observations relating to the whole number of criminals, and to the kind of crime, can be made in the Austrian monarchy, which contains very heterogeneous and widely different masses of population.

The order in which the proportion of the number of every kind of indictments to the population, has increased during the five years of 1824, 1825, 1826, 1827, and 1828, was in seven provinces of Austria, the following:—

Provinces.	Population.	Indictments to inhabitants.
Moravia and Silesia,	German and Sclavonian,	1 to 1707
Austria Proper,	German,	1 to 1676
Bohemia,	Sclavonian and German,	1 to 1428
Galicia,	Polish,	1 to 1382
Interior Austria,	German, Sclavonian & Italian,	1 to 609
Tyrol and Vorarlberg,	German and Italian,	1 to 322
Dalmatia,	Sclavonian,	1 to 138

The decreasing proportion of children visiting the schools, among one thousand able to attend, was in the same provinces in the years 1824, 1825, and 1828, the following:—

Provinces.	From 1000 Children went to School.
Austria Proper,	948
Tyrol and Vorarlberg,	945
Moravia and Silesia	919
Bohemia,	906
Dalmatia,	649
Interior Austria,	443
Galicia	115

* The legal qualification of a teacher consists in his having passed different examinations, the last by the Consistory court of the province where he intends to settle.

* In Germany, the first communion, called the *confirmation*, as well among the Protestants as with the Catholics, is held as necessary for every adult person as baptism, to allow him to join in any act celebrated by the Church, as marriage, taking the Lord's Supper, &c.

In comparing these two tables, I find the increase of crime with a decrease of education nearly agreeing in Austria Proper, in Moravia, Silesia, Bohemia, in Interior Austria, and even in Dalmatia, where the numbers are too small to furnish a fair and accurate judgment. But on the reverse, the Tyrolese, one of the noblest and bravest races of the world, sending nineteen-twentieths of their children to school, give more occupation to Austrian judges, than all the other provinces of the empire, except Dalmatia—the common asylum of fugitives from lawless Turkey, and Galicia, whose Polish inhabitants, shunning, like their brethren in Prussia, popular instruction, send only the ninth part of their children to school, and furnish at the same time by far less criminals than Interior Austria, Tyrol or Dalmatia.*

In relating these facts, which are probably much less contradictory than we might judge at first glance, I cannot help saying, after having stated my belief, that besides the influence of instruction there are many more elements which contribute to the increase or decrease of crime, (one of the principal of which is the pursuit in life) that more than any thing seems to depend upon the manner of elementary instruction, whether it be a mere mechanical one in reading, writing, arithmetic, and some geographical and historical knowledge, confining the highest information to the reading of the Scriptures, and to committing biblical verses to memory, or whether it is one resting on a religious and moral foundation, where all other knowledge imparted to the child, finds its test and its confirmation.

This opinion, though it diminishes in value the test of the information of convicts, which ought to be compared with what we have not, an accurate knowledge how many of the present adult population of any country in the world have been instructed or educated is not new. It has been maintained and even promulgated, in all parts of the world, by candid and benevolent statesmen and philanthropists.

In this country, we find Governor Wolcott saying as early as in 1826, in his message to the legislature of Massachusetts: "As high mental attainments afford no adequate security against moral debasement, it appears to be indispensably necessary that we should unite with our neighbors, and with all virtuous men of the present age, in maintaining our share in the great conflict which is prosecuting, of virtue against vice."†

Even eight years earlier, *John Falk*, the same who founded in 1813, the first House of Reform for juvenile offenders, said in a petition to the Chambers of the Grand Duchy of Weimar: "Of what use or advantage to the commonwealth are rogues that know how to read, to write or to cypher? They are only the more dangerous. The acquirements mechanically imparted to such men, can serve only as so many master keys put into their hands to break into the sanctuary of humanity."

To close these remarks by a similar statement from Great Britain, the connecting link between the experience of the eastern and of the western continent, I subjoin the following passage of an eminent medical writer:

"There is no one characteristic of the present age more remarkable than its inclination to undervalue all moral education. The wonders which have been effected by the mechanical inventions of Watt, Arkwright, (Fulton,) &c. seem almost to have overturned the common sense of the times, and every power is stretched to its utmost, to render the rising generation not a moral but a mechanical race. This is certainly exactly the reverse of what ought to take place, inasmuch as the happiness of men depends far more upon the proper control of their internal feelings, than their external circumstances; far more upon a mind 'void of offence' than upon the highest intellectual acquirements. Neither can there be a greater mistake than the supposition, that knowlege is always in itself beneficial. It is indeed a tremendous engine of good or evil. With him whose mind is directed aright, it is an instrument of advantage to himself and to the world; but with him whose moral feelings are not decidedly virtuous, it is but an additional and terrible weapon of ill."*

N. H. JULIUS.

PHILADELPHIA, 20th January, 1835.

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* The great amount of crime in Tyrol, may be, perhaps, accounted for, by the character of the Tyrolese, who, like most mountaineers, prefer, in their spirit of independence, to revenge a wrong, rather than to go to law, and by the circumstance that a very great number of the male population of Tyrol annually travel into foreign countries as pedlars, with goods manufactured at home.—LIEBER.

† First Report of the Managers of the Society for the Improvement of Prison Discipline. Boston, Second Edition, page 83.

* London Medical Repository.—New Series. Vol. iii. p. 337.

From the Pittsburg Gazette.

OLEAN AND BUFFALO.

Having had some curiosity to know at what time the navigation of the Allegheny river from Olean to Pittsburg usually commences in the spring, we yesterday called on Mr. Joseph Welsh, who keeps the tavern at which many persons from that country stop, to get information on that point. In reply to our question, he furnished us the following statement, taken from his books. The first arrival from Olean was, in

1831,	on the	30th	of March:
1832	"	15th	"
1833	"	31st	"
1834	"	20th	"

We believe that the harbor at Buffalo is not usually open before about the first of May, or certainly not earlier than the 24th of April. So that New York would have an outlet to the Ohio, by the way of Olean, at least one month earlier than by Buffalo. In that time a steam boat could run from Olean to St. Louis, discharge and receive cargo there, and return to Olean.

The dates above mentioned are the times when rafts arrived at Pittsburg from Olean, so that they must have left the latter place five or six days earlier.—This statement of facts exhibits the importance of the Rochester and Olean canal, and the Erie rail road in a strong light.

Since writing the above paragraph, we noticed that the Legislature of New York have rejected the bill in relation to the New York and Erie Rail Road.

The neglect to make this road will deprive the city of New York of some of the advantages which she might enjoy by the navigation of the Allegheny from Olean.

The New York Canal, not usually being open before the 15th of April, that is, about three weeks later than the average time of the opening of the Allegheny river from Olean. The Rail Road, being available earlier, would be adopted to deliver merchandize at Olean, until the Canal would be opened.

But, even throwing out of view the Rail Road, if the Rochester and Olean Canal was completed, it would be navigable three weeks earlier than the Lake at Buffalo.

METEOROLOGICAL TABLE FOR 1834.

By Alfred Creigh.

(*Concluded from page* 218.)

SEPTEMBER.

Days of the month.	9 o'clock.	12 o'clock.	3 o'clock.	Prevailing wind.	REMARKS.
1	67°	69°	69°	E	Rain
2	68	71	73	W	Cloudy
3	72	75	78	"	Clear
4	78	85	84	SE	Heavy Shower
5	76	80	81	S	"
6	75	78	82	SW	Clear
7	74	75	76	N	"
8	69	70	72	SE	Drizzling rain
9	75	75	78	W	Cloudy
10	64	85	66	NW	Clear
11	60	65	62	"	"
12	60	63	64	"	Cloudy
13	58	65	68	S	Clear
14	62	68	70	W	"
15	60	65	69	S	"
16	62	68	70	W	"
17	64	69	69	E	Showery
18	66	72	72	"	"
19	68	70	71	W	Clear
20	66	69	72	"	"
21	68	72	74	"	"
22	62	68	68	NE	" and rain
23	67	73	79	W	Clear
24	60	63	66	NW	Cloudy
25	62	71	78	W	Clear
26	64	78	83	"	"
27	63	67	69	NE	" and rain
28	57	56	56	"	" and cloudy
29	54	55	56	N	Clear
30	54	56	59	S	"

OCTOBER.

1	56°	62°	68°	S	Rain
2	58	65	67	"	Clear
3	57	66	78	W	"
4	60	62	64	E	Rain
5	56	60	64	NE	Clear
6	56	64	73	W	"
7	55	60	63	NE	"
8	58	65	68	W	"
9	54	56	56	E	Rain
10	56	66	74	W	Clear
11	53	57	63	"	"
12	56	61	64	S	"
13	50	52	54	NW	" Rain at ng't.
14	44	50	52	NW	Cold and Clear
15	47	55	57	W	Clear
16	42	45	50	"	Cloudy
17	51	62	74	"	Hail and rain.
18	54	60	73	W	Clear
91	47	53	55	"	Rain
20	46	49	53	W	Clear
21	44	49	55	"	"
22	47	54	62	"	"
23	51	57	60	"	"
24	48	56	60	NW	"
25	48	49	50	NE	Cloudy
26	48	48	54	E	"
27	49	55	59	SW	Clear
28	45	55	58	W	"
29	41	49	51	W	"
30	40	45	49	E	Cloudy
31	42	46	52	NE	" and Clear

NOVEMBER.

Days of the month.	9 o'clock.	12 o'clock.	3 o'clock.	Prevailing wind.	REMARKS.
1	44°	49°	51°	E	Cloudy.
2	41	41	41	"	Drizzling
3	40	42	46	SE	Cloudy
4	46	48	51	"	"
5	45	47	49	W	Rain and cloudy
6	46	48	54	NW	Clear
7	50	55	63	"	"
8	54	56	60	"	"
9	50	52	57	W	"
10	46	51	55	S	"
11	49	53	58	W	"
12	44	48	57	W	" and cloudy
13	48	54	59	W	Clear
14	47	50	52	N	"
15	38	37	37	NE	Clo'y. snow 3in's.
16	34	36	39	SE	"
17	34	35	36	"	Sleet and rain
18	40	44	47	W	Clear
19	46	46	46	N	"
20	46	47	51	"	"
21	49	54	59	"	"
22	42	43	44	NE	Rain
23	46	43	42	W	Cloudy
24	36	40	43	W	Clear
25	42	45	48	"	"
26	39	41	46	NE	"
27	40	43	48	W	"
28	44	48	52	"	"
29	42	43	45	E	Rain
3.	45	49	52	W	Clear

DECEMBER.

Days of the month.	9 o'clock.	12 o'clock.	3 o'clock.	Prevailing Wind.	REMARKS.
1	44°	48°	50°	W	Clear
2	43	44	49	E	Rain Clear
3	43	42	40	NW	Cloudy
4	36	38	40	W	Clear
5	42	43	48	"	"
6	41	44	49	"	"
7	40	46	50	S	"
8	45	46	42	W	"
9	38	43	45	"	"
10	33	40	43	"	"
11	35	40	47	SWW	"
12	35	36	38	W	"
13	35	39	41	NW	"
14	34	33	33	"	"
15	28	30	32	W	"
16	30	39	42	"	"
17	28	32	35	NE	Snow
18	29	31	32	"	Cloudy
19	35	36	36	"	Snow
20	36	38	40	"	Cloudy
21	39	41	40	W	"
22	38	41	43	"	"
23	38	40	44	NE	Drizzling
24	30	31	30	W	Clear
25	28	31	33	NE	Snow 3 inches
26	29	30	31	N	Clear and cloudy
27	32	34	35	NE	Clear
28	34	32	31	E	Cloudy
29	33	33	34	N	Snow 21 inches.
30	33	35	36	NE	"
31	36	38	40	W	Clear

CANALS AND RAIL ROADS COMPARED.

Several articles have heretofore appeared in the progress of the Register, tending to exhibit the comparative merits of the two modes of improvement, by canals and roads. Information on this subject has been deemed of importance, and we have believed it one in which our citizens are deeply interested. A report has lately been sent to us from the State of New York, made by the Canal Commissioners to the Assembly of that State on the 16th of March, 1835, accompanied by the opinions of "three civil engineers, of experience in the construction of Canals and rail roads," which we now commence to lay before our readers.

REPORT

Of the Canal Commissioners on a resolution of the Assembly of the 23d February, relative to the cost of canals and rail roads.

The Canal Commissioners, in obedience to a resolution of the Assembly, under date of the 23d ultimo, requesting them to report "at as early a day as conveniently may be, a statement showing the average relative cost per mile of canals and rail roads, the average relative expense annually of repairs and superintendence, and the average relative charges per ton, or other given quantity for transportation; and also, whether in their opinion, any, and what articles of produce, merchandise, or manufacture, can or can not, having a due regard to the saving of time, as well as other circumstances, be more advantageously conveyed on rail roads than by canals, with the reasons for their opinion, and such observations on the general subject of this resolution, as they may deem appropriate to guide the action of the Legislature in reference thereto," respectfully submit the following

REPORT:

The subject submitted to the consideration of the Commissioners, is interesting in its character, and of some puble importance. The comparative cost of constructing rail road and canals, the comparative cost of transportation, and the comparative expense of superintendence and repairs, are subjects which have occupied a large share of public attention; and respecting which, many speculative opinions have been advanced. At one period, the public were assured with some degree of apparent confidence, that rail roads would supersede canals; and it will no doubt, be recollected by many, that inquiries were made as to the probability of converting the Erie canal into a rail road.

Experience has gradually developed the relative utility of canals and rail roads for the transportation of property. We think the period is not distant, if it has not already arrived, when the superior advantages of a canal over a rail road, as a means of conveying property will be indisputably demonstrated.

It is believed that it will not be difficult to show, that the expense of transportation on rail roads, is very materially greater than on canals. In addition to this there are other important considerations in favor of canals.

A canal may be compared to a common highway, upon which every man can be the carrier of his own property, and therefore creates the most active competition, which serves to reduce the expense of transportation to the lowest rates. The farmer, the merchant, and the manufacturer can avail themselves of the advantage of carrying their property to market, in a manner which will best comport with their interest.

Much of the property which passes on the canals is carried by transportation companies; but the largest portion is carried by individuals and small associations. The individual who becomes the carrier of his own property, has the advantage of paying nearly one half of the expense of transportation, in the regular course of his business; and the cash disbursements often do not much exceed the payment of tolls. To the farmer, the profits on return freight in many instances gives a full indemnity for the expense of taking his cargo to market.

On rail roads the proprietors must necessarily be the carriers; and this is the general practice.

It appears that in the State of Pennsylvania an attempt has been made to permit an indiscriminate use of rail roads. On this subject the Canal Commissioners of that State, in their last annual report, remark as follows: "Before quitting the subject of rail ways the Canal Commissioners take occasion to remark, that the experience of the past season has convinced them that these roads, either as it regards revenue, facilities to trade or general accommo ation, will not answer public expectation, if thrown open like public highways, to be used indiscriminately. Every person who has paid the least attention to the transportation upon them since they were opened, must be convinced that an unrestrained and indiscriminate application of motive power is attended with danger, delays and interruptions. Safety, regularity and punctuality must first be secured, before those important links in our great chain of improvements can fully answer the purpose for which they were designed, and the board are decidedly of opinion that this desideratum is only to be obtained by the Commonwealth furnishing all the motive power, and directing its application."

There is some difficulty in furnishing an accurate comparative statement of the cost of constructing canals and rail roads. The character of the country in which a canal, or rail road is situated, and the manner in which they are constructed, have an important influence in determining their cost; and unless the prominent circumstances which have a bearing on this question are understood, it would be difficult to do more, than furnish an approximate estimate.

To furnish a statement of the actual cost of several canals, and rail roads, with a brief allusion to the prominent features which have a bearing on the question of cost, is the best evidence which can now be furnished, in answer to that branch of the inquiry.

The relative annual expense of superintendence and repairs, is not the subject of estimate on any fixed data; but must rest on experience. This expense would depend on circumstances which are hardly similar in any two cases. The character of the country, the permanency which is given to the work in its first construction, and the amount of business, governs this question to a great extent.

The Erie Canal was commenced in 1817, and completed in 1825. Every part of it has been in use 10 years, and some parts of it 15 years. In this period many of the structures of wood have been twice renewed, and all of them once. Several important improvements have been made, such as the widening of aqueducts, &c., and the banks on much the largest portion of the line, have been faced with stone and timber.—The great facilities which are furnished to accommodate the large trade which is done upon it, by removing bars and deposites in the bottom of the canal, guarding against breaches, their prompt reparation when they occur, gravelling the towing path, attendance at the locks, &c. &c. exceed the expenses which ordinarily occur on canals, and is much greater than would be necessary where a limited amount of business is done.

A statement of the average annual expenses for superintendence and repairs, from 1828 to 1835, will furnish the most accurate information which can be given in regard to this expense.

The annual expense of repairing rail roads has not yet been developed by experience.

The Manchester and Liverpool rail road was completed in 1830. The Baltimore and Ohio rail road, in 1831; and the Delaware and Hudson rail road, in 1829. These companies have severally given a particular statement of the actual annual cost for superintendence and repairs. But this expense will fall short of a true average after the lapse of time within which the wood work of these roads must be renewed.

The proprietors of these roads have furnished a detailed statement of the actual cost of transportation, independent of tolls or profit to the company; compared with the actual cost of transportation on the Erie canal, will furnish the best data which can now be given, of the relative expense of transportation on canals and rail roads.

The Commissioners have not had it in their power, since the receipt of the resolution, to which they are now replying, to investigate this subject with that care and attention which its importance demanded. One of the acting Commissioners is absent, on account of severe indisposition in his family, and another has been in feeble health. Under these circumstances, and with a view of giving the subject a speedy and careful examination, they called to their aid John B. Jervis, Holmes Hutchinson and Frederick C. Mills, Esqs. civil engineers, of experience in the construction of canals and rail roads. Their report, accompanied by several interesting tables, is herewith submitted.

The Commissioners have examined this report, and believe the general results to be correctly stated.—This report contains all the information which can now be given in answer to the several inquiries submitted to their consideration.

WM. C. BOUCK,
MICHAEL HOFFMAN.

March 17th, 1835.

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REPORT

Of John B. Jervis, Holmes Hutchinson and Frederick C. Mills.

To the Honorable the Canal Commissioners of the State of New York.

Gentlemen—

We have examined the question you submitted to our consideration, in relation to the relative cost of construction and repairs of canals and rail roads, and also the relative expense of transportation, and present in the following report, the facts and views we have been able to obtain. The importance of the subject compels us to regret, that more time could not consistently have been taken, to obtain further facts, and allowed us to carry the investigation into greater detail. We have felt compelled in a great degree, to confine ourselves to an exposition of prominent features, in the two methods of facilitating internal communication. We believe, however, the facts presented, and the exposition of the bearings of those facts, will be found useful, in leading to correct conclusions in regard to the question under consideration.

RAIL ROADS.

The utility of rail roads is materially, and in some respects, peculiarly affected by the ascent and descent that is overcome, and the relative amount of trade requiring transport in opposite directions. For instance, a rail road requiring transport only in one direction, would be most favorable with such a declivity in the direction of the freight, as would require the same power to move the loaded wagons, as would be necessary to return with the empty ones: and this declivity would decrease in cases requiring transport in both directions, and become level when the freight was equal.

In this country, it rarely occurs that freight is equal in both directions; more frequently it is 2, 3 and 4 to 1. To obtain the most favorable graduation to the trade to be accommodated, it is essential that it be uniform, or nearly so; which the route would not often admit without too great expense, and in some cases would be impracticable. On important lines for general trade that have any considerable extent, there will from the character of the country, often require a level, and sometimes a small ascent in the direction of the greatest trade; and it would be a a favorable compromise to exchange all acclivities and declivities for a level road. Though there would be exceptions, still it is believed a level road would afford a fair standard, in determining the general question of utility.

Below will be found a statement of the cost of several rail roads, and in some cases the cost of transportation.

It is to be regretted that more authentic information of a practical character is not in our possession. The authorities as well as the facts, are stated to show the weight which they are entitled to. In some important cases they are authentic; and these will be adopted as the basis of our conclusions.

Baltimore and Ohio Rail Road.

From Baltimore to Point of Rocks, 67½ miles, by report of chief engineer, (October, 1832,) this section was stated to be nearly complete, and the cost $29,193 per mile. In a document of second session 22d congress, No. 93, it is asserted this road had then cost nearly $34,000 per mile: We have examined the subsequent reports of the directors and their officers, and find nothing to change the statement of $29,193 per mile.

The grading of this road is done in a substantial and durable manner; over ⅔ of the superstructure is timber sills and rails, capped with an iron plate: ¼ (or 26-100) is stone rails capped with iron plates, and 1-17 is timber rails on light stone blocks.

The cost of transportation for the year ending 31st September, 1834, as per report of superintendent of transportation, was for motive power and all other charges, (excluding repairs of road,) except interest and fund for renewal of wagons, $62,348 57

Superintendent of machinery reports 1,000 wagons on the road; their cost is not given. They probably cost from $150 to $200 each; if on steel springs, the latter, otherwise the former; they may be estimated at $150 each, which for 1,000, is $150,000: interest on their cost, and to provide a fund for renewal, is believed should be at 25 per cent, which is, 37,500 00

Total cost of transportation, exclusive of tolls or profit, for 56, 120 tons, is 99,848 57

The average charge of the Company, per said report, is within a small fraction 4⅔ cents per ton per mile, produces the sum of, 116,254 79

The ratio of receipts to expenditures is 1 to 0.85, and $4.66 \times 0.85 = 3.96$ cents per ton per mile, as the expenses.

The expenses the previous year are stated by same report to have been higher: but as we have not the detailed statement, we cannot give the exact difference.

The rail road has ascents, descents, and curves, which affect the economy of transportation.

In regard to curves, this road may be considered as having more than is usual on rail roads, designed mainly for general trade.

All lines of rail road, of any considerable extent, will be curved more or less, according to the character of the country through which they are constructed. It is the first object to have it straight, and next, the lightest curvature the country will admit. The mini-

mum will therefore, be determined by local circumstances. While it is considered this road has more curvature than will occur as a general average, it is obviously impracticable to determine what this average may be. The chief engineer, J. Knight, of this (Balt. and Ohio) rail road, made experiments on the increased resistance produced by curves, which led him to the conclusion, that in a curve having a radius of 400 feet, the traction was increased 50 per cent. If locomotive engines were used, then loads would be regulated by the greatest resistance they had to overcome, on any part of the route; but a horse can increase his effort, for a short distance, which enables him on a road that has occasionally, sharp curves or ascents for moderate distances, to perform a greater average of useful effect, than can be obtained from locomotive steam power.—The freight business for this road is performed by horse power. The sharpest curves generally occur in short distances, intervening between straight lines and larger curves, and will not, therefore, affect the cost of transportation to so great a degree as if locomotive steam power was used. If we assume 10 per cent. of the resistance on a level and straight line, as the excess over a general average arising from extra curvature on this road, and apply it to the section between Parr Ridge and Baltimore, we shall not probably be far from its true influence on the cost of transportation.

The next, and most important question that affects the cost of this transportation is, the ascent and descent. The character of this road in relation to its elevations, seems to indicate the propriety of dividing it into sections, and applying on each, the power necessary, without regard to the other. The following divisions have therefore been made, to wit:

1st. From Baltimore to Parr Ridge, foot of 1st inclined plane—length, 40¼ miles; ascent westward, 590 feet; descent, 23 feet; total, 613 feet; ascent averages 14.75 feet per mile.

2d. Embraces the 4 inclined planes that pass Parr Ridge, 1.94 miles; ascent and descent, 429 feet, viz:

No. 1,	2,150 feet,	rise	$\frac{7}{26.75}$	=80 ft.	Total ascent 179 feet.
2,	3,000 '		$\frac{1}{30.12}$	=99 '	
3,	3,200 '	fall	$\frac{1}{20.05}$	=160 '	Total descent 241 feet.
4,	1,900 '		$\frac{1}{23.35}$	=81 '	
				Total;	feet 420

Intermediate level, about 3½ miles.

3d. From foot of plain No. 4, to end of continuous declivity westward, 11¼ miles; total descent, 285 feet; average, say 25 feet per mile.

4th. The remainder of road, to point of rocks and branch to Frederick, a fraction over 16 miles; descent westward, 169 feet; average 10.56 feet per mile, ascent westward, 131 feet.

Total rise and fall, 300 feet.

The ascent westward, for the 4 divisions, is	900	feet.
The descent ' '	718	'
Total ascent and descent,	1,618	'

By the report referred to, it appears the ratio of freight moving eastward to that moving westward, was nearly as 2 to 1; for calculation we therefore adopt this ratio.

It has been shown that the 1st division has an average ascent of 14.75 feet per mile. This ascent, however, is not uniform; in several places for short distances it descends westward, some portions are level, and the ascents are at rates varying between 2.64 and 37.48 feet per mile, excepting a short piece near the foot of inclined plane. They seldom much exceed 20 feet, except for short distances. The length of grades at the higher rates of ascent is generally less than one mile, and alternate with those of medium rate; except near the inclined plane. In view of the character of this division, it is believed animal power will allow such variations, as to accommodate the varying resistance, with nearly as much economy as on a uniform ascent. If we calculate on a uniform ascent of 18 feet per mile, we shall not probably vary essentially from the true economy of the case

It has been observed, the freight is as 2 to 1 in the opposite direction, being least westward. The weight of the wagons will probably be ⅓ of the gross load; and for computation, we may assume the wagon to weigh one ton; and consequently the freight eastward will be 2 tons and that westward 1 ton.

The resistance from friction is taken at 1–250 of the gross load, the velocity being low. On a level this will require nearly 9 pounds per ton, on an ascent of 18 feet per mile gravity will be 1–293 of the load, or 7.64 pounds per ton. The wagon and its freight going westward, makes a gross load of 2 tons; the resistance will therefore be $9+7\ 64\times 2=33.28$ lbs. To carry on a level road, a load which including wagons would be 3 tons, the resistance would be $9\times 3=27$ lbs. The road with a few exceptions, descends eastward or is level. The ascents are small and so near the eastern termination, that, in the average, less power would be required than on a level; but we require 33.28 lbs. to move westward, after providing for varied effort by the animal. Now, as a general result, we could not expect a more equal ratio of freight in the two opposite directions than in this case, and if 27 lbs. is required on a level, we have an excess of power to provide for the load moving westward, of $33.28-27=6.28$ lbs., and as this will return with the opposite load, we have extra power for the two directions=12.56 lbs. more than required for a level road, or 23 per cent. extra. This added to the extra curvature of 10 per cent. raises the extra traction to 32 per cent. on this section. The cost of the moving power is nearly 2-5 of the total expense, and $32\times .40=14.80$, say 15 per cent. the cost of transportation over a level road; and $40.25\times .15=6.03$, or equal an increase in the length of this division, of 6 miles.

2d division. The total ascent westward is, on the inclined planes, Nos. 1 and 2; their total length is 5,150 feet, and ascend at an average rate of one in twenty-eight and three fourths. It is obvious, the load moving westward will determine the expense of power, as that in the opposite direction on these planes will descend by its own gravity, requiring only the expense of breakmen to control its descent within a safe velocity, which may be done by part of the drivers, whose teams could be led back by others. In moving up this ascent, a horse would require 35 per cent. of his power to overcome the gravitating force of his body; but as he would be loaded only in one direction, and the length of either plane but little exceeding half a mile, it is believed to be a fair estimate to compute in this case, the useful effort of his power, as equal what it would be on a level. We have one ton of goods and one ton of wagon, making a gross load of 2 tons moving westward. The total resistance up the plane, will be 173 lbs., or 5.4 times greater than the load in the opposite direction, (3 tons gross,) would be on a level. The two planes are together, 0.97 miles in length. The ascent will make the extra resistance, equal $5.23\times .4=2.09$ miles.

The 3d and 4th planes descend westward; their total length is 5,100 feet, and descend at an average rate of $\frac{1}{21.15}$. For these planes, we must compute the power required to ascend them with the load moving eastward, which is 3 tons including wagon. The horse will require 47 per cent. of his power to overcome the gravitating force of his body up the plane; and though he will as in the case of the other planes, be loaded

only in one direction, still it is believed that 10 per cent. should be taken from his average useful effect in ascending Nos. 3 and 4. The resistance of 3 tons up these planes will be 344 lbs., equal 11.73 times greater than on a level, or including the loss in the effective power of the horse, equal 13.13 times greater.—The two planes are .96 miles $\times 13.13 \times \cdot 4 = 4\frac{3}{4}$ miles extra length of transportation. The influence of the planes on this division, increases the moving power equal to what would be required for 17 miles of level road, and taking the moving power at 40 per cent. of the total expense of freight, a fraction over $6\frac{3}{4}$ miles, entire cost of transportation.

3d division—Ascends eastward at the average rate of 25 feet per mile, varying from 9.76 to 52.80. The grades that have the higher rates of ascent are short, and in view of the small amount of labor required of the horses in the opposite direction, it will probably not vary materially from the truth, to compute the power at the average rate of ascent, or 1-211. A load eastward is 3 tons including wagons, and the resistance will be 58 lbs., equal 2.14 times that on a level; or for 11.25 miles, requiring extra moving power, equal what would be required for 12.82 miles on a level, or equal the total expense of transportation for $5\frac{1}{4}$ miles.

4th division is quite of an undulating character; the ascent is greatest in the aggregate in the direction of the greatest trade, but the grades have a less rate of ascent, than in the opposite direction. The average ascent in the direction of the greatest trade, will be a fair basis of computation for the section. This is 1.500, and the resistance for 3 tons, (as before,) is 40.44 lbs. or 50 per cent. greater than a level. For 16 miles the extra moving power is equal 8 miles on a level, or equal the total cost of transportation for $3\frac{1}{4}$ miles nearly.

	Miles.
In the first division we have extra equal,	6
' Second, ' '	$6\frac{3}{4}$
' Third, ' '	$5\frac{1}{8}$
' Fourth, ' '	$3\frac{1}{4}$
	$21\frac{1}{8}$
Total length of road is,	71
	92.12

The actual cost of transportation has been shown to be 3.96 cents per ton, per mile. To reduce this to our standard, we have the cost of transportation, exclusive of toll or profits, 3.05 cents per ton per mile, with freight as two to one in the different directions.

By report of superintendent, the moving power cost 1.08 cents per ton, per mile.

Repairs.

Year, ending October, 1833, $444 per mile.
' ' ' 1834, $321 ' '

Average, for 2 years, $382.50.

A road constructed mostly of timber will vary much in the cost of repairs for different years, and several are therefore necessary to obtain a proper average.

Cost of transporting passengers per mile, 1.98 cents, as stated in Hazard's Register of Pennsylvania, v. 15, p. 112.

Liverpool and Manchester railway.

In a statement published by Mr. Booth, the treasurer of the company, dated June 30, 1830, the expenditure up to that time, including an estimate, (the road was at this time nearly completed,) to finish some unimportant items of work, it appears the construction of the railway, exclusive of warehouses, wharfs, offices, engines, wagons and other items not connected with the construction of the road, cost £694,595 for 31 miles, equal £22,406 $\times$ 4.80 = $100,748 per mile.—There have subsequently, been heavy expenditures, not embraced in the account of repairs, but we are not sufficiently advised of their object to say, whether or not, any part of it belonged to the amount of the original construction of the road.

Repairs.

It appears from four semi-annual reports of the directors, the expense of repairs have been as follows, viz:

Report of July, 1822, 1st January to 30th June,	£7,331	0	6
' January, 1833, 1st June to 31st December,	6,878	4	3
' July, 1833, 1st January to 30th June,	6,714	9	3
' January, 1834, 1st July to 31st December,	6,425	14	8
Total for 2 years, . .	£27,349	8	8

Equal, for 31 miles, 882 $\times$ 4.80 = $4,233 per mile, which, for one year, is equal $2,116 per mile, commencing about a year after the road was opened for business.

A table is given of the general expenses in the six months previous to that reported in July, 1832, in which the expenses of repairs is included with some other items. This aggregate sum is very nearly the same as reported in detail, showing there had been no material variation in repairs for the six months previous to that particularly reported.

Transportation.

The reports above referred to, embrace 4 semi-annual accounts for transportation, and one tabular view of transportation for 6 months previous, from which the following table is made.

The report of July, 1832, contains a statement of transportation for the two semi-annual terms preceding.

In the tabular account given by the directors, the maintenance of way and rate, taxes and omnibuses are charged to transportation; but in the following table, these are not included, as it is the design to exhibit the cost of transportation separate from other expenses; these items are given in the table of directors' reports, with others, but are separate in the general account.

From the reports of the directors and their statement of general accounts, it appears probable, the amount of repairs of wagons and coaches, includes the purchase of new ones when required, to supply the place of those that fail: the interest account is supposed to be interest on cost of locomotives, engines, coaches, wagons, &c.; there is no other item that embraces the interest on the outlay, and it is presumed this is intended. There is a charge for carting included with other items, and from the general account would appear to be about 6d per ton: we have not deducted this item, for the reason it was impracticable to determine exactly what it amounted to; and the question whether the interest account included the total interest on the outlay for the transportation department, with such allowance as would, beyond what was included in repairs, make the necessary renewals, being doubtful, we have thought a further reason for leaving it as it is. The table cannot, however, be far from the proper expense of transportation.

For Merchandize.

The lowest cost pr. ton is 5s 5d. = $1 31, or pr. mile 4.22c.
The highest ' 7. s 2¼d. = $1.72 ' 5.55 '
The medium or average of the table is 6s 1d.
= $1.46, or per mile, 4.70 cts.

For each Passenger.

The lowest cost is 1s. 7⅞d. equal to $0.39¾, or per mile, 1.28 cents.
The highest cost is 2s. 4½d., equal to $0.56½, or per mile, 1.82 cents.
The average cost 1s. 11¾d., equal to $0.47½, or per mile, 1.53 cents.

Table B, contains the aggregates for one term of six months later than table A: it does not appear that transportation was lower for this term than previously, but on the contrary is confirmatory of the above average results; which may therefore, be viewed as based on three years experience.

TABLE B—*Showing the number of passengers, and the tons of merchandise, passing the whole length of the road; and also receipts and expenditures for the entire transportation, including the way and coal business, and that passing the whole length of the Liverpool and Manchester road.*

INFORMATION, WHERE OBTAINED.	Passengers.			Merchandise.			Total.		Excess of receipts over expenses.	Ratio of receipts to expenditures.
	No.	Expenses.	Receipts.	Passing through	Expenses.	Receipts.	Expenses.	Receipts.		
		£.	£.	*Tons.*	£.	£.	£.	£.	£.	
Semi-annual report of directors, dated July, 1831, for 6 months, ending December, 31, 1831,	—	25,930	58,348	—	21,841	29,022	49,025	89,809	40,784	as 1.83 to 1
Semi-annual report of directors, for 6 months, ending 30th June, 1832,	174,122	21,957	40,044	57,174	22,445	30,436	46,658	74,706	28,048	1.60 1
Semi-annual report of directors, dated Jan. 1833, for 6 months, ending 31st Dec. 1832,	182,823	23,744	43,120	61,995	22,277	35,509	48,278	80,902	32,624	1.67 1
Semi-annual report of directors, dated July, 1833, for 6 months, ending 30th June, 1833,	171,421	24,746	44,130	68,284	26,447	38,149	52,900	86,071	33,171	1.62 1
Semi-annual report of directors, dated Jan. 1834, for 6 months, ending 30th Dec. 1833,	215,071	27,345	54,685	69,806	27,357	38,641	56,350	97,234	40,884	1.70 1
Rail road Journal, vol. 3, 609, given as facts from report of directory of July, 1834, for 6 months, ending June 30th, 1834,	244,326	—	50,770	77,528	—	44,014	60,092	94.784	34,692	1.57 1

NOTE.—It will be perceived the column of tons, only embraces that passing the whole length of the road, while the receipts and expenses on transportation include the way business.

TABLE A—*Showing the cost of transportation per passage, and per ton of merchandize, for 31 miles on the Liverpool and Manchester rail road.*

DISBURSEMENTS, &c.	Report of January 1832.		Report of July, 1832.		Report of January, 1833.		Report of July 1833.		Report of January, 1834.		Average of five semi-annual statements.	
	Cost per passenger.	Cost pr. ton, of merchandize.	Per passenger.	Per ton of merchandize.	Per passenger.	Per ton of merchandize.	Per passenger.	Per ton of merchandize.	Per passenger.	Per ton of merchandize.	Per passenger.	Per ton of merchandize.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Disbursements in the merchandize department, consisting of porterage, salaries, carting, stationary engine, disbursements, &c. &c.,	—	4 6¾	—	4 0	—	3 5	—	3 7½	—	3 9¾	—	3 10½
Disbursements in the coaching department, comprising porterage, salaries, repairs, &c. &c.,	0 7	—	0 7¾	—	0 6¾	—	0 9¼	—	0 9	—	0 7¾	—
Locomotive power account, proportioned according to the number of trips of 30 miles in each department; comprising repairs of engine, wages, coke, &c.	0 6¼	1 11	0 7½	1 7¼	0 10¾	1 2¼	1 0	1 6¾	0 8¾	1 6½	0 9	1 4¾
Sundry disbursements, proportioned according to receipts, as between coachery and merchandize, comprising police and gate establishment, and general office,	0 1⅞	0 3¾	0 2	0 4	0 1¾	0 3¼	0 2	0 3½	0 2⅛	0 2⅝	0 2	0 3⅜
Interest, on loans and chief rents, proportioned according to the amount of profit in each department, calculated exclusively of these items of disbursement,	0 4¾	0 4¾	0 6¼	0 8¼	0 4½	0 7	0 5	0 6¾	0 4¼	0 4⅞	0 5	0 6⅜
Total disbursements,	1 7⅞	7 2¼	1 11½	6 7½	1 11¾	5 5½	2 4½	6 0½	2 0⅛	5 11¾	1 11¼	6 1

Having ascertained the cost of transportation on the Liverpool and Manchester rail way, we now proceed to reduce the cost of freight to our standard of comparison; a level road.

Inclined plane at Liverpool.

Length, 1.12 miles; rise 1-48. The *extra* cost of the transit for moving power, taking the average from two semi-annual reports, is 1.80 cts. per mile, 2,02 cents for the total length, per ton; equal, for total cost of transportation, to 0.43 of a mile, on a level.

Sutton and Whiston Planes,

Are each 1½ miles long, and have an inclination of 1-96 or 55 feet per mile, They incline in opposite directions, and therefore, if the trade was equal in each direction, only one plane should be calculated as affecting the total transportation; as it is obvious, a load passing in either direction, would only require additional power to ascend one plane. In the reports of the directors they give the total freight, not distinguishing *between* the different directions; and we are left to determine, from the general character of the trade, whether any and what difference there was. It appears that not more than 1-6 of the tonnage between the two cities passes on the rail way; and we, therefore, are led to infer the rail way takes the lighter character of freight, which is probably about equal in both directions; and our computation of cost is made on this basis.

This road being worked entirely by locomotive steam power, except the inclined plane at Liverpool, which has stationary power, our computation is made accordingly.

In ascending the plane the resistence will be 1-225, (friction) + 1-96, (gravity,) = 1-67, or ratio to a level of (3.35 to 1,) or a little more than three and one-third to one. The power of the engine will be reduced by its gravity, and that of its tender to 70 per cent of its power, on a level; or to make it equal its power on a level, it must be increased to 142 per cent, which makes the cost of moving power to ascend the plane, as compared with a level, as 4 75 to 1, or four and three-fourth to one. The extra moving power to ascend this plane over a level, is equal to the transit of 5.62 miles on a level. The moving power is 26 per cent of the total transportation, exclusive of the interest account in which the items of moving power and wagons are blended; this will not be less than 4 per cent, making the total cost of moving power at least 30 per cent.—The extra cost of the planes are therefore equal 1.68 miles entire transportation on a level.

The greatest inclination on any part of this rail way, except the inclined planes above mentioned, is 1 880 or 6 feet per mile. It is presumed the ascent of this inclination will regulate the load of the engines, on which the resistance will be 1-225 + 1.880 = 1-179, or ratio to a level of 1.25 to 1. The power of the engine will be reduced by its gravity, and that of its tender to 97 per cent, or its power must be increased over what would be required on a level, say to 104 per cent, making the cost, as compared with a level, as 1.30 to 1. This will be applicable to 27 miles of road, on which the extra cost for moving power is equal 8.1 miles, or for entire transportation equal 2.43 miles.

The influence of the elevation on this rail way in increasing the cost of transportation over that of a level is (43 + 1.68 + 2.43 = 4.54,) a little more than four and a half miles of level way. The actual average cost of transportation for 31 miles was found to be (4.7,) nearly four and three-fourths cents per ton, which, reduced to a level road, we find to be (4.07,) over four cents, per ton per mile.

An interesting fact is developed in this investigation, in relation to the comparative cost of transportation on inclined planes by stationary and by locomotive steam engines. The plane at Liverpool is worked by stationary steam power, and has an inclination of 1 48 or 110 feet to the mile. The Whiston and Sutton planes, worked by locomotive steam power, have an inclination of 1-96 or 55 feet in a mile, being exactly half the inclination of the Liverpool; yet the cost of moving power on the Liverpool to Whiston or Sutton is as 1 to 2.90; showing that locomotive power, for an ascent of 55 feet to the mile, is about three times the expense of stationary power for a plane 110 feet to the mile, calculated for equal horizontal distances. It should be observed, in relation to this fact, that economy of stationary power on inclined planes, depends materially on the amount of business. In this case it was about 500 tons per day.

Baltimore and Washington rail road.

This road commences at a point in the Baltimore and Ohio rail road, about 6 miles from Baltimore, and extends 30 miles to the city of Washington. Its operations are conducted by the Baltimore and Ohio company. In their report of October, 1833, they state the estimated cost at a little over $53,000 per mile, for 26 miles. The estimate for the whole 30 miles is given at $50,000 per mile, in a report on canals and rail roads, as presented, 25th June, 1834, to the House of Representatives in Congress. In their report of October, 1834, the directors say the graduation and masonry, (the part of the expenditures liable to the principal contingencies,) is nearly completed; they make no allusion to the probability of the work costing more or less than the estimate; and as it would be natural to do so, if any important disagreement was probable, it is inferred the road would cost the estimated sum; and being so near completed we have thought it proper to put it in the table. This road has iron rails on stone foundation, except the embankments, which have timber foundation.

Columbia rail road.

This rail road is 82 miles long, and per last report of Pennsylvania commissioners, the road has cost, including an estimate for an unimportant amount of unfinished work, $40,450, per mile. It has mostly iron rails, partly on stone and partly on timber foundation.

Alleghany Portage rail road.

This rail road is 36 miles long, and per report of Pennsylvania commissioners, has cost, including a small estimate for unfinished work, $47,977, per mile. It has iron rails for a fraction over two-thirds its length, about half of which are on stone foundation, and the balance on timber; nearly one-third is timber road with iron plates.

Mohawk and Hudson rail road.

The main stem of this road is 16 miles in length. It has timber rails with iron plates, about half of which are on a stone foundation, and the other half on timber. Cost per mile of double road, $38,107, per company books. (They have also about 3½ miles of single road in branches that cost $15,847 per mile.)

Actual cost of transportation for freight by locomotive and stationary steam, 3.5 cents per ton per mile. All the ascent for the greatest trade, (being as 3 to 1,) is overcome by one stationary engine, which does not materially enhance the ratio of cost over a level, taking the whole road. Experience has been quite limited on this road, and considering that the ratio of trade in different directions, in connection with the facility of overcoming the principal elevation by stationary power, would not materially increase the cost of transportation over a level, it has not been thought important to reduce it by computation. The cost of transporting passengers has been 1.7 cents per mile.

Saratoga and Schenectady rail road.

This rail road is 22 miles long. It is constructed with a timber rail, capped with an iron plate on timber foundation, except about three miles that has a light stone foundation. This road has a single track; it cost, per report of directors, November, 1832, $11,010 per mile, exclusive of building, &c.; to make a second track of the same character, would cost $6,000, making the total cost for double road $17,010 per mile.

Delaware and Hudson Canal Company rail road,

Is 16 miles long, has 5 mile of double and 11 miles of single track. The valleys on this road were generally bridged with timber. The road is timber with an iron plate. It cost originally, including stationary engines, about $10,500 per mile, (the exact amount not known.) To have made it double would have raised the expense to $14,000 per mile; average annual repairs for four years is $623 per mile. Transportation when the business is at 250 tons per day, is 4 cents per ton per mile, and when 500 tons per day, is 3 cents per ton per mile. This arises mostly from the cost of operating the planes, which is nearly the same in both cases.

The ascent of this road (855 feet) is overcome by five stationary steam engines, working on planes whose total length is 2½ miles. The cost of motive power for 500 tons per day, averages essentially the same as it does for horse power on a level, having the same in horizontal length. From the summit the principal descent is effected by three self-acting engines, so arranged that the loaded wagons draw up the empty ones: and the balance of the declivity is advantageously arranged for a descending trade. The economy in the use of stationary steam power, arising from the cheapness of fuel, and the great regularity which may be obtained in a coal business, and the comparatively small amount of agencies to conduct the business, leave no doubt on our minds, that transportation is effected on this road as cheap per ton per mile as a general business could be on a level road.

New Castle and Frenchtown rail road,

Is 16 miles long; timber rail capped with iron plate, about one-third on light stone foundation and the remainder on timber; cost $30,000 per mile, (see report of committee on roads and canals to Congress, January 25th, 1834.)

Camden and Amboy rail road.

The part extending from Amboy to Bordentown is 33 miles in length, is believed to be entire iron rail, partly on stone and partly on timber foundation; cost (as per congressional report above mentioned) 30,000 per mile.

South Carolina rail road,

Is 130 miles long; timber rail capped with an iron plate. This road is built on piles; no embankments made in the grading; cost about $7,000 per mile. It is not known whether it is a single or a double road, but believed to be mostly single track.

There are several important rail roads in the United States, which we should have been gratified to have added to those above given. But we have not the information in relation to them, that would enable us to derive any practical advantage. There are others that we have not thought proper to introduce in a question that relates to the general utility of rail roads as public thoroughfares: they are roads made mostly for local objects, or for short distances, where the surface of the ground is nearly level, and the road made to conform nearly to the natural level or inclination, and very little expense incurred to remove those irregularities in the surface, which in a road of any considerable length and importance, are generally encountered to obtain an economical grade: and the superstructure of such roads are usually made in an imperfect manner, not calculated to serve the purpose of accommodating an important general trade.

In the roads described, it is believed a fair view may be obtained of the general question of cost. In their *graduation* some have been of an expensive character, to wit: The Baltimore and Washington, Allegheny Portage, the Columbia, Mohawk and Hudson, and a part of the Baltimore and Ohio, though on the average the latter cannot be much above a medium: the Camden and Amboy, and the New Castle and Frenchtown rather below a medium, and the Saratoga as very favorable. The South Carolina road having been placed on piles, excavation has been avoided as much as possible, and embankments omitted altogether, by which the expense of grading has been very little. The general character of the superstructure has been stated; and their rails, or the foundation of the rails appear to be, to a great extent of timber.

The superstruction of rail roads when composed of timber with the rail capped with an iron plate will cost, for a double track, from $6,000 to $10,000 per mile, according to the value of timber and the stability given to the road; (this is exclusive of grading.) The cost on the Baltimore and Ohio, for this kind of road, was $8,852 per mile. When composed of iron rails, laid on stone foundations, the cost will vary from $18,000 to $25,000; according to the convenience in obtaining stone, the extent of the ballasting, and the weight of rail that may be adopted; the probable average may be $22,000 per mile. The difference then, between a medium of the two kinds, is $14,000 per mile. To have adopted the iron rail on a stone foundation in the roads mentioned, would have materially increased their average cost. But in the first construction, it is usual, even when iron rails are adopted, to put down a timber foundation to support them on the embankments, until the embankments have time to become fully setttled.

The first rail ways in England, were constructed of timber without any iron. The timber being found to wear too rapidly under the wheel, the iron plate was then put on. From this rude beginning in rail roads, their advantages began to be developed; and experience soon suggested improvements. Hence we find the wooden rail soon abandoned, even in the coal districts. Cast iron rails on a stone foundation followed timber; and now wrought iron is generally used in preference to cast iron. These remarks are introduced to show the result of experience in England. In this country, timber will doubtless be used to a greater extent, and for a longer period, than it was in England.—The cheapness of timber, the want of capital, and the limited amount of business in many places, will operate as causes to produce this result. We already observe, however, in this country, a departure from the use of timber rails on several important rail roads. Among those who have critically attended to this subject, there is probably very little difference of opinion, in regard to the most suitable material for rails and their foundation, when an extensive business may be anticipated, and particularly where a high velocity is an object. The Baltimore and Ohio rail road company, after an experience of several years with timber rails, have come to the following conclusion, as appears in their last annual report: "In the construction of the Washington road, the board have had regard to its durability, not less than to making it a source of immediate profit to those interested in the undertaking. The experience of the main stem, has *conclusively* shown, how important it is, to avoid the expense of repairs of the rail way, which not only materially affect the revenue, but occasion constant *interruption* and *inconvenience* to the *travel* on the road. True economy consists in constructing the road, in the first instance, so as to obviate the necessity of *frequent* repairs, and to enable the *motive power* used in transportation, to be employed to its fullest effect, without the *fear* of injury to the rails or bridges over which it passes in the performance of its daily work."

Timber is found to be less durable in a rail road than in almost any other situation. The action of the carriages tend to open the pores of the timber, which renders them more liable to imbibe moisture; all horizontal joints are much exposed under this action, and particularly that under the rail plate. There is, no doubt, situations where timber may be advantageously adopted. The cheapness of this article, the scarcity of stone for foundations, the scarcity of capital, limited extent of business, and the experimental character of the particular investment, will often present arguments in favor of its adoption. At the same time, we are fully of the opinion, that all rail roads, which constitute important avenues of communication, the period is not distant when timber rails will be wholly abandoned for iron.

The question in relation to the average cost of rail roads, it will be difficult to determine, as the graduation will be very different at different places. The table given, of the cost of several rail roads, excluding the Liverpool and Manchester, would afford an average of $30,393 per mile. Had all these roads been constructed entirely with iron rails and stone foundations, their average cost would probably have been between $35,000 and $40,000 per mile. Taking all the raid roads, designed to accommodate a large general trade, that have been constructed in this country, and add to their expense what would be required to complete an iron rail road with stone foundations, we believe the cost for a double road would not fall below $35,000 per mile; and to reduce the same to a timber road of the best character, would not be less than $25,000 per mile. The grading in both cases, is supposed to be done in a permanent manner. We are aware of the fact, that rail roads, in some instances, have been made for much less; but for the reasons before given, we do not believe them entitled to a place in this examination, which is designed to investigate the utility of rail roads as a means of general intercommunication of trade. There is no doubt, many situations where the favorable formation of the country, and the facilities for obtaining materials, will reduce the cost below the amount stated above, and the less expensive road may be sufficient for the trade to be accommodated. But there will be others that will be more expensive, as experience has fully demonstrated; and our object is to reach an average result for the accommodation of a general trade, where expedition, regularity and economy in the moving power will be important. It should be observed in relation to this question, that the cost of a rail road will depend materially on the amount of tonnage, and the speed it is necessary to maintain. This arises from the economy of motive power; for instance, where a small amount of business is to be accommodated, it will be economy to apply greater motive power, and avoid expensive graduation; on the other hand a large amount of trade, will induce greater expense in bringing the lines of graduation to the most favorable standard for economising this power.

Remarks in relation to repairs on Rail Roads.

Experience on this point is yet quite limited. We have the account of the two years on the Baltimore and Ohio road, four years on the Delaware and Hudson company road, and four semi-annual statements of the Liverpool and Manchester road. We have also, in relation to the latter, a general statement of the half year preceding and the half year subsequent to the four full reports, from which we are led to infer that no material variation occurred for three years. The average of the three roads of $1,040 per mile per annum.

There is a great difference in the annual expense of repairs for these roads, which suggest the propriety of examining into the cause.

The moving power on the Baltimore and Ohio, and also on the Delaware and Hudson company's road, admitted for freight, only a moderate speed, probably seldom exceeding 4 miles per hour, and nearly the same amount of tonnage was conveyed on each: on the latter, no passengers are carried; on the former, the passengers constitute about half the business.

The Baltimore and Ohio road has less timber in its structure, though it has a large majority of timber road. The Delaware and Hudson Company road is about ⅔ single track, and considering the passenger business has not over half the use, and still its repairs are more than 50 per cent. higher. Two years with a moderate amount of trade, on a timber road, would not give a fair average of the cost of repairs, and the condition of the two roads at the end of the year, in regard to the age and durability of their timber, may be very different. We are, therefore, led to conclude, that further experience will show the repairs on the Baltimore and Ohio road, as the business increases, to be greater than they have hitherto been.

The Liverpool and Manchester road has cost over five times as much for repairs as the Baltimore and Ohio, and over three times as much as the Delaware and Hudson Company road. The Liverpool road was made in the most substantial manner, with very little curvature. The Baltimore road is very much curved, which increases the expenses of maintaining the parrallelism of the rails. The statement of the cost of repairs and maintenance by the directors of the Liverpool road is very explicit, and continued for successive terms with very little variation; leaving no ground to misunderstand the subject. The amount of business on the Liverpool has been from three to four times as great, as on the Baltimore for equal terms of time; and the velocity of travelling both with freight and passengers, has been also much greater on the former than on the latter.—In view of all the facts we have obtained, we are led to the conclusion, that the amount of business, and the velocity of travelling, has a material influence on the question of repairs. In the last report, the directors of the Liverpool road, they allude to the expenses of maintaining their road on the Whiston and Sutton planes, in consequence of the high velocity which the engines and wagons often obtain in their descent; and propose to lay heavier rails to guard against this inconvenience. In a report recently made to the directors of the London and Birmingham rail way, by R. Stephenson, (late engineer of the Liverpool road,) on the propriety of adopting the undulating plan; he urges, as an objection of this plan, the injurious tendency of the high velocities obtained in the descents to the road and particularly to the locomotive engine, as a reason that he considers conclusive against it.

The repairs of a rail road composed mostly of timber will generally be much less for two or three years after it is put into operation, than the average for a term of ten or fifteen years. Our experience is limited in this branch of the investigation. but from the facts we have obtained, we are led to the conclusion, that the average expense of repairs for a road, designed to accommodate a large general trade requiring a high velocity, will not be less than that stated as the average of these roads, viz: $1,040 per mile per annum.

Transportation on Rail-Roads.

The cost of transportation (reduced to a level road,) on the Baltimore road, we have found to be 3.05 cents per ton per mile, and 4.07 cents per ton per mile on the Liverpool road. In the former case, it is done by horse power, in the latter, by locomotive (except on one plane,) steam power. The ratio of cost of motive power to the entire cost of transportation is for the Baltimore road as 4 to 10; and for the Liverpool road, as 3 to 10. It, therefore, appears, that the Liverpool road, with 10 per cent less ratio in cost of motive power, (which makes the motive power nearly equal on the two roads,) cost one third more for entire expenses of transportation. If our accounts can be relied on as pre-

senting accurate results, it would appear highly probable the extra expenses in repairs and management of the business, was incurred in consequence of the greater speed maintained. Some abatement should doubtless be made, for the ratio of difference in expense of loading and unloading, which, in consequence of its being shorter, would bear heavier on the Liverpool road, than on the Baltimore. The accounts for the Liverpool transportation are presented in much detail, and are very satisfactory in their character. Those for the Baltimore road are not given in as much fulness and detail, but we have no reason to doubt their accuracy. It further appears, that horse power is a little more expensive for motive power, at a low velocity, than locomotive steam, at a high velocity, as compared for the two roads. But this would not be the case if the power was reversed for the two roads, as the short ascents on the Baltimore road would greatly depress the economy of steam power. The average cost of transportation on these two roads, when reduced to a level, is 3.56 cents per ton per mile. This allows no profit or toll; the cost stated for the Mohawk and Hudson road is 3.5, and for the Delaware and Hudson Company's road is also 3.5 cents per ton per mile, as the nett cost. It may, therefore, be considered that experience thus far has settled the cost at 3½ cents per ton per mile, on a level road.

It has been shown in this investigation, that where locomotive steam power is used, it is important to its economy, to have all the inclination reduced to a uniform angle, and the curves to a uniform radius, otherwise the traction that occurs on the sharpest curves, and greatest ascents, will determine the load of the engine. It is obvious that the load of the engine must be regulated by its ability to overcome the greatest resistance that occurs on the road over which it passes, unless extra power is stationed on the line to aid in passing ascents: the inconvenience of stationary power would prevent a resort to this method, unless the increased power required, was considerably greater than was generally necessary on the route travelled. This consideration is highly important where a large general trade is to be accommodated, and accounts for the great expense that is often encountered to bring the grade to the most favorable standard.

The cost has been shown to be 3½ cents per ton per mile on a level, and as rail roads are not often entirely level, it has been thought proper to a full understanding of the subject, to present a statement, showing the comparative economy in motive power, by locomotive steam engines on roads of different inclinations. In the calculations, the engine is assumed to weigh 6½ tons (13,000 lbs.,) with 7,000 lbs. on its working wheels; adhesion at 10; the weight of the tender at 7,000 lbs.; resistance from friction $\frac{1}{225}$. The load carried is exclusive of the tender, and includes freight and wagons.—Two thirds of the gross load will be tonnage goods.

On a level the gross load will be,	75.29 tons.
On a road or section having an ascent of 10 feet per mile,	49.53
On a road or section having an ascent of 20 feet per mile,	37.35
On a road or section having an ascent of 30 feet per mile,	27.24
On a road or section having an ascent of 40 feet per mile,	20.22
On a road or section having an ascent of 50 feet per mile,	17.04
On a road or section having an ascent of 60 feet per mile,	13.92
On a road or section having an ascent of 70 feet per mile,	11.31

In the load on a level, we have 50 tons exclusive of wagons, taking the cost of motive power at 40 per cent of the entire cost of transportation; the total cost on the level being 3.5 cents.

The total cost on an ascent of 10 feet per mile is per ton,	4.20 cts.
The total cost on an ascent of 20 feet per mile is per ton,	4.90
The total cost on an ascent of 30 feet per mile is per ton,	5.95
The total cost on an ascent of 40 feet per mile is per ton,	7.28
The total cost on an ascent of 50 feet per mile is per ton,	8.19
The total cost on an ascent of 60 feet per mile is per ton,	9.66
The total cost on an ascent of 70 feet per mile is per ton,	11.41

There are engines of a larger size than the one assumed; but it is the most approved at this time, in reference to the weight of engine, and the weight of the working wheels. This however is unimportant, as the comparison will not be at all affected by varying the power of the engine: the ratio between a level and the ascents will remain the same notwithstanding.

(*To be concluded.*)

READING, March 31, 1835.

To the Editor of the Commercial Herald.

As you have turned your attention *and that of the Public*, through the medium of your valuable paper to the internal improvements of the State, I now send you the original MSS. of the proceedings of the first meeting held in relation to the improvement of the Schuylkill. In 1813 when that meeting was held, the prejudices of the people through this section of country were absolutely insurmountable—Canals through a farm, the Schuylkill dam'd up, descending trade during high water obstructed, seemed to nerve every heart to determined opposition, and it was in vain that the enlightened amongst us, endeavoured to allay this feeling of hostility.

The forbearance and prudence of the Schuylkill Navigation Company, together with the large sums of money disbursed along the line, eventually in a great measure neutralized those angry opponents to the measure.

The opinions then entertained by this meeting, show how very far they were from foreseeing the immense advantages of that improvement. When speaking of the use of Coal, they say the Coal mines will afford cheerful and comfortable fires to the citizens of Reading, Philadelphia and *perhaps* New York.

It may well be said, improvements in this country are so rapid that before their advantages can be *anticipated*, they are enjoyed.

NAVIGATION OF THE RIVER SCHUYLKILL.

At a numerous assemblage of the citizens of Schuylkill County, at the house of Mr. A. Reifschnider in Orwigsburg, on Tuesday the 13th of December, pursuant to public notice, Dr. J. M'Farland was appointed Chairman, and George Dreibelbis, Secretary of the meeting.

In an appropriate address from the Chair, the objects of the meeting were distinctly exhibited, and after a fair discussion and mature deliberation on them, the following resolutions offered by James B. Hubley, were ascertained to convey the united sentiments of all present, and received their unanimous approbation.

Resolved, That this meeting feel a lively interest in the measures adopted by their fellow citizens in the lower counties and in Philadelphia, for the improvement of the Navigation of the River Schuylkill.

That every project which is intended to supply our countrymen with articles before of foreign importation, is calculated to strengthen our Independence and ought to; and we are persuaded will be attentively listened to by the Legislature of Pennsylvania.

That at a period when our foreign commerce is destroyed and the capital employed in it, may be advantageously turned to Domestic Trade, all Internal navigation will be carefully encouraged, and when such navigation will effect an interchange of products of great necessity as well as of comfort, it will merit a liberal patronage from our State Government.

That the opening of the Schuylkill up to Mill Creek, or even higher, is an undertaking so clearly practicable, and so highly beneficial to private as well as the public interest of the state, that should even the period of its accomplishment be unhappily prolonged, it must eventually arrive, and none can be more favorable than the present.

That should this river be rendered navigable it requires no efforts of imagination to perceive the productions of the interior of the state of New York, borne along its channels: and the products of this county, finding their way into the capital of that State.

The Plaister from Onondago and the borders of the Cayuga, will be seen like the fertilizing Nile, producing abundance in our soil.

The Wheat trade which hitherto has been enjoyed but partially, and at seasons will become a constant source of wealth to our citizens: perhaps even the salt which is manufactured in the central part of the State of New York, may afford us supplies in times of scarcity: above all our extensive coal mines, whilst they will afford cheerful and comfortable fires to the citizens of Reading, Philadelphia and perhaps New York, will together with our lumber and iron become inexhaustible sources of prosperity to the inhabitants of Schuylkill county.

Resolved, Therefore, That we will cordially co-operate with our fellow citizens of Berks, Montgomery and Philadelphia, in endeavouring to procure the passage of a law to ensure the success of this useful undertaking, on such principles as will best accord with the interests of this county as well as the public utility.

Resolved, That to effect this interesting object the following persons be a Committee of Superintendance, viz: Dr. J. M'Farland, George Dreibelbis, John Pott, D. Graeff, J. Krebs, Jer. Reed, J. Hughes, Theo. Hughes, A. Reifschneider, J. Kepner, W. Green, G. Rahn, J. Old, D. Yost, B. Kepner, J. Huntringer, H. Boyer, H. Hesser, A. Fertig, J. Hoch, C. Kerchner, C. Wagner, G. Orwig, Jac. Reed, D. Focht.

Resolved, That this Committee be requested to circulate for signature such memorials to the Legislature as may be consistent with the views of this meeting.

Resolved, That the following persons be a Committee of mission to wait on the members of our Legislature at their present session, and to request the passage of such a law, as is above contemplated, viz: Dr. James McFarland, John Pott, John Hughes and George Dreibelbis and that they be also a Committee of Correspondence to communicate with such other committees as may be appointed on the subject.

Resolved, That the proceedings of this meeting be signed by the Chairman, attested by the Secretary, and published in the Reading papers, and Editors of other papers who are favorable to the project are also requested to give them an insertion.

JAMES McFARLAND, Chairman.

Attest by
GEORGE DREIBELBIS, Sec'ry.

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In Vol. II. of the Register, page 118, will be found a memorial presented to the Legislature in 1791—by "The Society for promoting the improvement of ROAD AND INLAND NAVIGATION,"—furnishing estimates for different routes, by clearing the navigation of certain waters. In this the "estimate of the expense of clearing the navigation from Philadelphia to Pittsburg," by the Schuylkill, Tulpehocken, Quitipahilla, a canal of 15 miles to Swatara, by this last to Susquehanna, Juniata to Huntingdon and Poplar run, then a portage to Canoe place on Conemaugh of 18 miles, then down Conemaugh to the mouth of Stoney creek, then down Conemaugh and Kiskeminetas to the Allegheny River and down to Pittsburg, in all, 426 miles,) was only £40,116 2 0. From tide water on the Schuylkill to Reading, the estimate by David Rittenhouse and others, was £1,147 0 0. Other routes and estimates for connecting the waters of the State with those of New York will be found in the same article. The whole is a curious document, and will prove interesting, as exhibiting the enlarged views of the Society at that early day, on the subject of improvement, although a different and much more expensive system has been adopted.

MESSAGE OF THE GOVERNOR.

Extract of a letter, dated

HARRISBURG, March 21, 1835.

Dear Sir,—Accompanying I send you the copy of a Message received to day from the Governor. The subject of it appears to me to be one of high importance to the commerce of Philadelphia. The effect of the improvement will be to tap the commerce of New York—even that which passes over the Public Improvements now made and her new rail road along the Pennsylvania Line to the Lake when made.

To the Senate and House of Representatives of the Commonwealth of Pennsylvania.

Gentlemen.—I have received from the Secretary of the War Department, several communications growing out of a Resolution of the House of Representatives of the United States of the 23d of January last, "directing him to forward copies of the Report and Profile of Major Bache's survey of a route of a rail road from Williamsport in Pennsylvania to Elmira in the State of New York;* to the Governors of Pennsylvania and New York with the request that they lay the same before the Legislatures of their respective states," copies of which, together with the documents accompanying the same will be laid before you. The importance of the contemplated improvement, and the advantages which must result from its completion, to the citizens of those portions of the respective States through which it will pass, as well as to the respective States, are made so manifest by the accompanying documents that any attempt on my part to enlarge upon them, would be entirely superfluous. I shall content myself, therefore with a single remark, that the practicability of the enterprise will be found, by an examination of the survey and report of Major Bache, to be unquestionable, and that the commerce it would open between the two States if completed, and the transportation it would invite in the interchange of the coal and iron of Pennsylvania, for the plaster and salt of New York, independently of the carriage of other products of the respective States upon it, would, there is reason to believe, more than justify its construction.

The papers and documents, however, are transmitted to the General Assembly for their examination and candid and impartial consideration. GEO. WOLF.

HARRISBURG, March 21, 1835.

* For some documents in relation to this road, see Register Vol. ix. pp. 18, 89, Vol. x. p. 246.

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